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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

TRAN, CON P

ART UNIT

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2615

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/628,380	Applicant(s) SEO ET AL.	
	Examiner CON P. TRAN	Art Unit 2615	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 January 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 5-8, 10-14, 16, 18, 19, 27 and 29-36 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 5, 11, 13, 14, 16, 18, 19 and 31-36 is/are rejected.
- 7) ☒ Claim(s) 6-8, 10, 12, 27, 29 and 30 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Objections

1. Claim 27 is objected to because of the following informalities:

In Claim 27, line 16 states "the pulse width modulators comprise N pulse width modulators", line 19 states "all the six pulse width modulators", and line 20 states "N is an integer". It is unclear how many "pulse width modulators" being claimed. It is noted an integer can be zero or negative;

In Claim 27, line 21 "tuning" should be - - turning - -.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. **Claims 5, 31, 32-33, and 36** are rejected under 35 U.S.C. 103(a) as being unpatentable over O'Brien U.S. Patent 6,429,737 (hereinafter, "O'Brien' 737") in view of Rosback U.S. Patent 4,641,361.

Regarding **claim 5**, O'Brien' 737 teaches a multi-channel PWM (Pulse Width Modulator) apparatus (see col. 3, line 63 – col. 4, line 9; see Figs. 1, 7, and respective portions of the specification), comprising:

a plurality of pulse width modulators (PWM 119, Figs. 1, 7) for modulating audio signals (112, 70, 71, Figs. 1, 7) into PWM-based multi-channel audio signals (outputs of PWMs; col. 3, lines 8-15; col. 5, lines 39-48); and

a gain control unit (volume control 114, Fig. 1) connected to the plurality of pulse width modulator (119, Fig. 1; PWM, Fig. 7) for control gains of the audio signals received at the plurality of pulse width modulators, wherein the gain control unit independently controls gains of at least a portion (i.e., the whole signal) of the audio signals according to individual channels (col. 2, lines 8-39; volume control controls gains of each channel by itself, i.e., independently controls although not individually controls).

However, O'Brien' 737 does not explicitly disclose wherein the gain control independently control gains to be at different levels.

Rosback discloses a multiple band automatic gain control (AGC) circuit (10, Fig. 1) in which each frequency component is processed in a separate gain adjustment circuit (i.e., as a function of magnitude of the signal at the output of band splitter; col. 2, lines 25-45).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have incorporated the automatic gain control (AGC) circuit taught by Rosback with the multi-channel PWM apparatus of O'Brien' 737 wherein the

gain control independently control gains to be at different levels as claimed for purpose of providing the circuit response characteristics in the individual bands can be simultaneously controlled as suggested by Rosback in column 1, lines 49-50.

Regarding **claim 31**, O'Brien' 737 in view of Rosback teaches the apparatus as set forth in claim 5. O'Brien' 737 in view of Rosback, as modified, further teaches wherein the gain control unit includes a plurality of gain controllers (VGA 16, 18, 20, Fig. 1, see Rosback, col. 2, lines 39-51), each independently controlling a gain of audio signals (i.e., as a function of magnitude of the signal at the output of band splitter; col. 2, lines 25-45) received at a respective one of the pulse width modulators (119, Fig. 1; PWM, Fig. 7; see O'Brien' 737).

Regarding **claim 32**, O'Brien' 737 in view of Rosback teaches the apparatus as set forth in claim 5. O'Brien' 737 in view of Rosback, as modified, further teaches wherein the gain control unit (AGC circuit 10, Fig. 1; see Rosback) independently controls a first number of the audio signals to be at a first level and a second number of the audio signals to be at a second level (i.e., as a function of magnitude of the signal at the output of band splitter; col. 2, lines 25-45; independent, nonuniform, col. 3, lines 7-11).

Regarding **claim 33**, O'Brien' 737 in view of Rosback teaches the apparatus as set forth in claim 32. O'Brien' 737 in view of Rosback, as modified, further teaches

wherein the first number is greater than one and the second number is greater than one (i.e., as a function of magnitude of the signal at the output of band splitter; col. 2, lines 25-45; independent, nonuniform, col. 3, lines 7-11).

Regarding **claim 36**, O'Brien' 737 in view of Rosback teaches the apparatus as set forth in claim 5. O'Brien' 737 as modified, teaches further comprising a controller to independently control phases of the audio signals, wherein the second controller adjusts phases of at least a portion of the audio signals to be different (delay timing control 120 for each PWM 119, Figs. 1, 4-8; col. 3, lines 16-22, col. 5, lines 16-48).

3. **Claims 13-14** are rejected under 35 U.S.C. 103(a) as being unpatentable over Kondo et al. U.S. Patent 7,047,325 (hereinafter, "Kondo") in view of O'Brien U.S. Patent 6,429,737 (hereinafter, "O'Brien' 737"), and further in view of Rosback U.S. Patent 4,641,361.

Regarding **claim 13**, Kondo teaches an audio/visual receiver (DVD, VCR, tuner, monitor; col. 7, lines 49-56; see Figs. 18, 22, 38, and respective portions of the specification), comprising:

a reader (DVD player 96A, Fig. 38) configured to output a first data signal based on information stored in a recording medium (col. 42, lines 13-21);

a tuner (61, Fig. 18) configured to output a second data signal (col. 27, lines 34-40);

a decoder (81, Fig. 22) coupled to the reader configured to decode the data signals into audio signals (col. 31, lines 9-18);

at least one speaker (306, Fig. 42) configured to receive and output the PWM-based multi-channel audio signals (see col. 44, lines 45-51).

However, Kondo does not explicitly disclose a pulse width modulator device configured to modulate the audio signals into PWM-based multi-channel audio signals that comprises, a plurality of pulse width modulators configured to modulate the audio signals into the PWM-based multi-channel audio signals; and a plurality of signal controllers coupled to the plurality of modulators to independently control at least one of input signals and output signals of the plurality of pulse width modulators.

O'Brien' 737 teaches a pulse width modulator device configured to modulate the audio signals into PWM-based multi-channel audio signals (see col. 3, line 63 – col. 4, line 9; see Figs. 1, 7, and respective portions of the specification), that comprising:

a plurality of pulse width modulation means (PWM 119, Figs. 1, 7) for modulating audio signals (112, 70, 71, Figs. 1, 7) into PWM-based multi-channel audio signals (outputs of PWMs; col. 3, lines 8-15; col. 5, lines 39-48); and

a plurality of signal controllers (via volume control 114, Fig. 1) coupled to the plurality of modulators to independently control at least one of input signals and output signals of the plurality of pulse width modulators (col. 2, lines 8-39), wherein the plurality of signal controllers comprise a plurality of gain controllers (via volume control 114, Fig. 1) that each receive one of the audio signals received for a corresponding one of the plurality of pulse width modulators (PWM 119, see Figs. 1, 7), wherein the gain

controllers independently control gains of the received audio signals according to individual channels (col. 2, lines 8-39; volume control controls gains of each channel by itself, i.e., independently controls although not individually controls).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have incorporated a pulse width modulator of O'Brien' 737 device teaching with an audio/visual receiver of Kondo to obtain a an audio/visual receiver as claimed for purpose of reducing or eliminating noise that leak from one channel to another, as suggested by O'Brien' 737 in column 4, lines 63-67.

However, Kondo in view of O'Brien' 737 does not explicitly disclose wherein the gain control independently control gains to be at different levels.

Rosback discloses a multiple band automatic gain control (AGC) circuit (10, Fig. 1) in which each frequency component is processed in a separate gain adjustment circuit (i.e., as a function of magnitude of the signal at the output of band splitter; col. 2, lines 25-45).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have incorporated the automatic gain control (AGC) circuit taught by Rosback with the audio/visual receiver of Kondo in view of O'Brien' 737 wherein the gain control independently control gains to be at different levels as claimed for purpose of providing the circuit response characteristics in the individual bands can be simultaneously controlled as suggested by Rosback in column 1, lines 49-50.

Regarding **claim 14**, O'Brien' 737, as modified, further teaches wherein the plurality of signal controllers comprise a plurality of phase shifters that phase-shift modulated output signals received from the pulse width modulators (delay timing control 120 for each PWM 119, Figs. 1, 7; col. 3, lines 16-22).

4. **Claims 16 and 18** are rejected under 35 U.S.C. 103(a) as being unpatentable over Kondo et al. U.S. Patent 7,047 (hereinafter, "Kondo") in view of O'Brien U.S. Patent 6,429,737 (hereinafter, "O'Brien' 737"), in view of Rosback U.S. Patent 4,641,361 and further in view of Beard U.S. Patent 5,796,359.

Regarding **claim 16**, Kondo in view of O'Brien in view of Rosback teaches the receiver of claim 14.

However, Kondo in view of O'Brien in view of Rosback does not explicitly disclose wherein the plurality of signal controllers comprising a plurality of controllers that independently enable the plurality of pulse width modulators according to individual channels.

Beard discloses a data conversion system (10, 50, Figs. 1, 2) having pulse width modulation (24) in which the control circuitry (40) selectively disables the pulse-width modulator (24, col. 2, lines 45-52; col. 5, lines 41-48; col. 6, lines 30-33).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have incorporated a control circuitry of Beard teaching with a receiver of Kondo in view of O'Brien' 737 in view of Rosback to obtain a control means

for independently turning on/off the plurality of pulse width modulation means according to individual channels as claimed for purpose of providing a lower costs solution to data conversion and data processing than was otherwise available, as suggested by Beard in column 2, lines 43-45.

Regarding **claim 18**, this claim has similar limitations as Claim 16. Therefore it is interpreted and rejected for the reasons set forth in the rejection of Claim 16.

5. **Claims 19** is rejected under 35 U.S.C. 103(a) as being unpatentable over O'Brien U.S. Patent 6,429,737 (hereinafter, "O'Brien' 737") in view of Rosback U.S. Patent 4,641,361, and further in view of Beard U.S. Patent 5,796,359.

Regarding **claim 19**, O'Brien' 737 teaches a multi-channel PWM (Pulse Width Modulator) apparatus (see col. 3, line 63 – col. 4, line 9; see Figs. 1, 7, and respective portions of the specification), comprising:

a plurality of pulse width modulators (PWM 119, Figs. 1, 7) configured to modulate audio signals (112, 70, 71, Figs. 1, 7) into PWM-based multi-channel audio signals (outputs of PWMs; col. 3, lines 8-15; col. 5, lines 39-48); and

a plurality of signal controllers (via volume control 114, Fig. 1) coupled to the plurality of modulators for controlling at least one of input signals and output signals of the plurality of pulse width modulators (col. 2, lines 8-39), wherein the plurality of signal controllers comprise a plurality of phase shifting means for phase shifter

modulated output signals received from the pulse width modulation (delay timing control 120 for each PWM 119, Figs. 1, 7; col. 3, lines 16-22),

wherein the plurality of signal controller comprise a plurality of gain controllers (i.e., controller, via volume control 114, Fig. 1) for receiving the audio signals received at the plurality of pulse width modulators (PWM 119, see Figs. 1, 7), wherein the gain controller independently controls gains of at least a portion (i.e., the whole signal) of the received audio signals according to individual channels of the pulse width modulators (col. 2, lines 8-39; volume control controls gains of each channel by itself, i.e., independently controls although not individually controls), and

wherein the plurality of signal controllers comprise a plurality of controllers for independently control the plurality of pulse width modulators according to said individual channels, while audio signals are being received at said PWM apparatus (col. 2, lines 8-39; volume control controls gains of each channel by itself, i.e., independently controls although not individually controls).

However, O'Brien' 737 does not explicitly disclose wherein the gain controllers independently control gains of the received audio signal to be different.

Rosback discloses a multiple band automatic gain control (AGC) circuit (10, Fig. 1) in which each frequency component is processed in a separate gain adjustment circuit (i.e., as a function of magnitude of the signal at the output of band splitter; col. 2, lines 25-45).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have incorporated the automatic gain control (AGC) circuit

taught by Rosback with the multi-channel PWM apparatus of O'Brien' 737 wherein the gain controllers independently control gains of the received audio signal to be different as claimed for purpose of providing the circuit response characteristics in the individual bands can be simultaneously controlled as suggested by Rosback in column 1, lines 49-50.

However, O'Brien' 737 in view of Rosback does not explicitly disclose wherein a plurality of controllers for independently turning on/off the plurality of pulse width modulation means according to individual channels.

Beard discloses a data conversion system (10, 50, Figs. 1, 2) having pulse width modulation (24) in which the control circuitry (40) selectively disables the pulse-width modulator (24, col. 2, lines 45-52; col. 5, lines 41-48; col. 6, lines 30-33).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have incorporated a control circuitry of Beard teaching with an apparatus of O'Brien' 737 in view of Rosback to obtain a plurality of controllers for independently turning on/off the plurality of pulse width modulation means according to individual channels as claimed for purpose of providing a lower costs solution to data conversion and data processing than was otherwise available, as suggested by Beard in column 2, lines 43-45.

6. **Claims 11, 34-35** are rejected under 35 U.S.C. 103(a) as being unpatentable over O'Brien U.S. Patent 6,429,737 (hereinafter, "O'Brien' 737") in view of Rosback U.S. Patent 4,641,361, and further in view of Yoshida U.S. Patent 4,173,739.

Regarding **claim 11**, O'Brien' 737 in view of Rosback teaches the apparatus as set forth in claim 5. However, O'Brien' 737 in view of Rosback does not explicitly disclose further comprising: a controller for independently turning on/off the plurality of pulse width modulators according the individual channels.

Yoshida discloses an overload detecting circuit for a PWM amplifier, which includes a DC voltage source having a pair of terminals; first and second switching elements connected in series between the terminals of the DC voltage source; a signal input circuit for ON/OFF controlling the first and second switching elements (col. 1, lines 7-11; col. 2, lines 3-9).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have incorporated the overload detecting circuit for a PWM amplifier taught by Yoshida with an apparatus of O'Brien' 737 in view of Rosback to obtain a controller for independently turning on/off the plurality of pulse width modulators according the individual channels as claimed for purpose of decreasing the generation of heat in the switching element, as suggested by Yoshida in column 1, lines 64-65.

Regarding **claim 34**, O'Brien' 737 in view of Rosback teaches the apparatus as set forth in claim 5. However, O'Brien' 737 in view of Rosback does not explicitly disclose further comprising: a controller to selectively turn off one or more of the pulse width modulators when a predetermined condition is detected.

Yoshida discloses an overload detecting circuit for a PWM amplifier, which includes a DC voltage source having a pair of terminals; first and second switching elements connected in series between the terminals of the DC voltage source; a signal input circuit for ON/OFF controlling the first and second switching elements (col. 1, lines 7-11; col. 2, lines 3-9).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have incorporated the overload detecting circuit for a PWM amplifier taught by Yoshida with an apparatus of O'Brien' 737 in view of Rosback to obtain a controller to selectively turn off one or more of the pulse width modulators when a predetermined condition is detected as claimed for purpose of decreasing the generation of heat in the switching element, as suggested by Yoshida in column 1, lines 64-65.

Regarding **claim 35**, O'Brien' 737 in view of Rosback, and further in view of Yoshida teaches wherein the predetermined condition is an overload condition (col. 1, lines 7-11; col. 2, lines 3-9).

Response to Arguments

7. With respect to objection to the claim, the claim 11 has been amended. Accordingly, the objection is removed.

8. With respect to rejections under 35 U.S.C. 112, second paragraph, claim 7 has been amended. Accordingly, the rejections are withdrawn.

9. Applicant's arguments filed January 28, 2008 have been fully considered but they are not persuasive.

10. Applicants assert on pages 12-13, regarding claim 5:

“However, the gain controllers of Rosback do not “independently control” the gains of at least a portion of a plurality of channel signals. In fact, Rosback teaches away from these features. At column 3, lines 7-21, the Rosback patent discloses that the three gain controllers 22, 24, 26 do not operation completely independent of one another. . . . In view of these disclosures, it is evident that the gain controllers of Rosback operate dependently on one another. Moreover, the gain controllers of Rosback are not connected to a plurality of pulse width modulators.”

Examiner respectfully disagrees. Since Claim 5 is an open-ended claim, the claim does not exclude the presence of the uniform of the control characteristics of the automatic gain control circuit (see Rosback, “nonuniform gain across the three bands”, col. 3, lines 7-14). In other words, the three gain controllers are independent within a limit of deviation. In addition, limitation “completely” is not in the claim. As presented in the Office Action, it is O'Brien' 737 in view of Rosback teaches the gain controllers are connected to the pulse width modulators.

11. Applicants further assert on page 14, regarding claim 5:

“As for the disclosure at column 1, lines 49-50, here Rosback merely discloses that the gains of its high, mid, and low frequency band signals are simultaneously controlled. Neither this nor any other portion of Rosback teaches or suggests the independent control features recited in claim 5.”

Examiner respectfully disagrees. Please see above for response. For further clarification, Rosback explicitly discloses “Compression control is therefore effectively decoupled from gain control, permitting the two to be adjusted independently of one another.” (See Rosback, col. 6, lines 51-53).

Regarding Applicant’s arguments of dependent claims 31, 32, and 33, please see above responses of claim 5. Also, as presented in the Office Action, it is O’Brien’ 737 in view of Rosback teaches the claimed limitations.

Regarding Applicant’s arguments of claims 13, 14, 16 and 18, please see above responses of claim 5.

Allowable Subject Matter

12. **Claims 6 and 12** are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

13. **Claims 7, 8 and 10** would be allowable if claim 6 overcame the objections, set forth in this Office action.

14. **Claim 27** would be allowable if rewritten or amended to overcome the objections set forth in this Office Action.

15. **Claims 29 and 30** would be allowable if claim 27 overcame the objections, set forth in this Office action.

Conclusion

15. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Art Unit: 2615

Any inquiry concerning this communication or earlier communications from the examiner should be directed to CON P. TRAN whose telephone number is (571)272-7532. The examiner can normally be reached on M - F (08:30 AM - 05:00 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor VIVIAN C. CHIN can be reached on 571-272-7848. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/CPT/
May 23, 2008

/Vivian Chin/

Supervisory Patent Examiner, Art Unit 2615